DSP

dsp_Lec4_ report 3

sec 3 محمد محمد عبد الغفار سلام

Q: for $X(z) = \frac{z}{z^2+4}$, find $x(n)$

$$X(z) = \frac{z}{4\left(\frac{z^2}{4}+1\right)}$$

$$= \frac{1}{2}\frac{z/2}{\left(\left(\frac{z}{2}\right)^2+1\right)}$$ Compare with $\frac{z\sin w}{z^2-2z\cos w+1}$

* $2z\cos w = 0 \Rightarrow w = 90^\circ = \frac{\pi}{2}$

$\Rightarrow \sin\frac{\pi}{2} = 1$

$$\therefore \; z^{-1}\left[\frac{1}{2}\frac{z/2}{\left(\left(\frac{z}{2}\right)^2+1\right)}\right] = \frac{1}{2}(2)^n \sin\frac{\pi n}{2}$$

Turn Over ⟹

DSP

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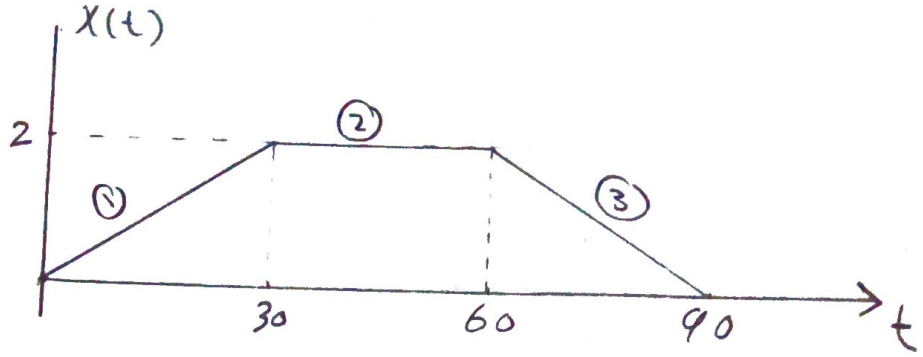
Q: find $X(z)$, given $T = 1$



Solution:-

① $x(t) = \frac{1}{15} t$, $[0-30]$ ② $x(t) = 2$ $[30-60]$

③ $x(t) = \frac{1}{15}(90-t)$ $[60-90]$

for $T = 1$

① $x(n) = \frac{1}{15} n$ ② $x(n) = 2$ ③ $x(n) = \frac{1}{15}(90-n)$

$$x(n) = \frac{1}{15} n \underbrace{u(30-n)}_{A} + 2 \underbrace{u(n-31)\,u(60-n)}_{B} + \frac{1}{15} \underbrace{u(n-61)\,u(90-n)}_{C}(90-n)$$

$$ZT\,(A) \Rightarrow \sum_{n=0}^{\infty} \frac{1}{15} n u(30-n) z^{-n} = \frac{1}{15} \sum_{n=1}^{30} n z^{-n}$$

$$ZT\,(B) \Rightarrow \sum_{n=0}^{\infty} 2\,u(n-31)\,u(60-n)\,z^{-n} = 2 \sum_{n=31}^{60} z^{-n}$$

$$ZT\,(C) \Rightarrow \sum_{n=0}^{\infty} \frac{1}{15} u(n-61)\,u(90-n)(90-n)\,z^{-n} = \frac{1}{15} \sum_{n=61}^{89} (90-n) z^{-n}$$

$$\therefore X(z) = \frac{1}{15}\left[\sum_{n=1}^{30} n z^{-n} + \sum_{n=61}^{89} (90-n) z^{-n}\right] + 2 \sum_{n=31}^{60} z^{-n}$$